CENTER FOR INTEGRATED NANOTECHNOLOGIES

Exploring the continuum from scientific discovery to the integration of nanostructured materials into the micro- and macro world

World-class expertise and unique capabilities (synthesis, fabrication, characterization, and theory) available at the Center for Integrated Nanotechnologies (CINT) focus on creating, characterizing, understanding, and integrating materials at different length scales (from nano- to meso-scale) with controlled functionalities.

USER PROGRAM

CINT operates as a national user facility. As a vibrant partnership between Los Alamos and Sandia national laboratories, CINT leverages the unmatched scientific and engineering expertise of our host DOE laboratories and provides access to state-of-the-art facilities staffed by scientists, postdoctoral fellows, and technical support personnel who are leaders in the CINT scientific thrust areas. Access is via peer-reviewed technical proposals.

SCIENCE THRUSTS

Nanoscience centers are defined by a scientific field, not specific instrumentation. CINT expertise is organized in four scientific thrust areas.

- Nanoscale electronics and mechanics
- Nanophotonics and optical nanomaterials
- Soft, biological, and composite nanomaterials
- Theory and simulation of nanoscale phenomena

SELECTED CINT CAPABILITIES

Synthesis and fabrication

- Quantum dots, nanoparticles
- Biomolecular composites
- Semiconductor nanowires
- Metamaterials and plasmonic nanomaterials
- Semiconductor molecular beam epitaxy
- Epitaxial nanocomposite films pulsed laser deposition, laser molecular beam epitaxy
- CVD for 2D nanostructured films
- Dip-pen nanolithography
- Atomic precision lithography
- Integration lab: A suite of processing tools for fabrication

Theory

- Molecular dynamics and Monte Carlo simulations
- Classical and quantum density functional theory
- First-principles density-functional theory + dynamical mean-field theory for strongly correlated electronic systems
- Exact-diagonalization approach
- Quantum dynamics and pump-probe spectroscopy in coupled and strongly correlated electronic systems
- Non-adiabatic excited state molecular dynamics in molecules

Characterization

- 3D tracking images
- Ultrafast optical spectroscopies
- In situ transmission electron microscopy
- Optomechanics
- Quantum transport
- Nanomechanics and nanomanipulator
- Discovery platforms
- Holographic optical trapping

U.S. DEPARTMENT OF ENERGY
Office of Science

cint.lanl.gov **(505) 606-0150**

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MATERIALS PHYSICS AND APPLICATIONS

Cultivating cutting-edge science through national user facilities

NNSA National Nuclear Security Administration